Lycée Des Arts — Mathematics — 9ᵗʰ-Grade

Name: . . . .   *"Graphing of a line in plane"*   A.S-7.3.
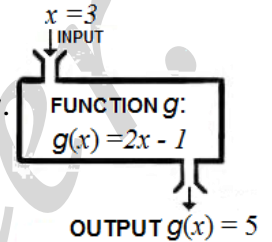
Reminders:
- A straight line is a set of infinite number of collinear points in plane.
- To draw a straight line we need the coordinates of two points
- A point belongs to a line, if its coordinates satisfy its equation

Terminologies:

If $(f): y = ax + b$ is a st. line, where $a \neq 0$ & b are real numbers then we say

↳ f : is the **rule** or **machine** that gives for **every input x one and only one output y**.

↳ x : is the pre-image of the given rule.

↳ y or $f(x)$: is the image of x by f.

$x = 3$
INPUT

FUNCTION g:
$g(x) = 2x - 1$

OUTPUT $g(x) = 5$

How to trace in an orthonormal system of axes the line $(f): y = x + 1$?

1) Pick up any value of x, ex: $x = -1, 0, 1, 2$ ... (A line is composed of infinite number of points)
2) Replace these values in equation of (f) (A pt belongs to a line, if its coordinates satisfy its eqn)
3) Choose to values of x only. (To draw a straight line we need the coordinates of two points)
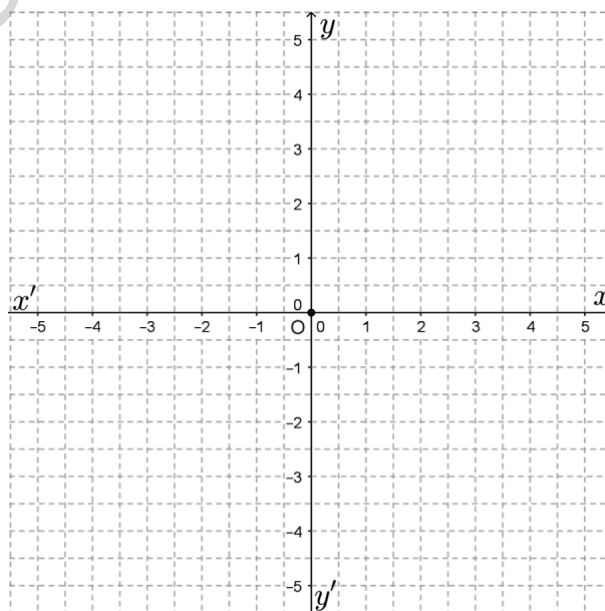4) For clear representation complete the table.

$(f): y = x + 1$		
x	0	2
$y = f(x)$	$(0) + 1$	$(2) + 1$
(x, y)	$(0; 1)$	$(2; 3)$
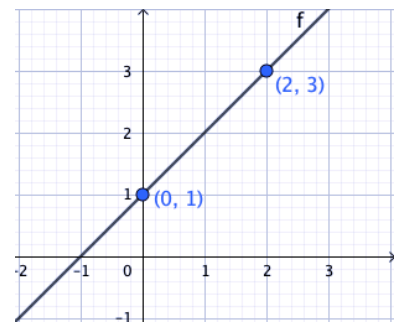
5) Plot the above points on an orthonormal systems of axes
6) Join the plotted points to get the line.

Ex₁: Graph the following straight lines on the below orthonormal systems of axes:

1) $(d_1): y = 2x + 1$ 4) $(d_4): y = -2x$
2) $(d_2): y = -2x - 1$ 5) $(d_5): y = -1$
3) $(d_3): y = 3x$ 6) $(d_6): x = 3$

Ex₂:Graph in the following orthonormal systems of axes straight lines of

☞ Group-*A*:

$(r): y = x - 1$

x		
y		
$(x; y)$		

$(s): y = 2x + 1$

x		
y		
$(x; y)$		

$(k): y = 3x + 2$

x		
y		
$(x; y)$		

☞ Group-*B*:

$(n): y = -x - 3$

x		
y		
$(x; y)$		

$(i): y = -2x + 1$

x		
y		
$(x; y)$		

$(f): y = -3x + 2$

x		
y		
$(x; y)$		
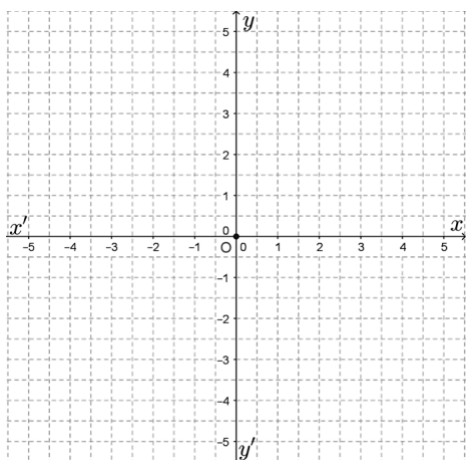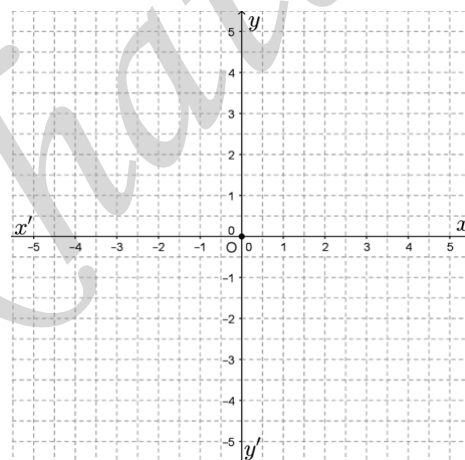
Group-A

Group-B

a. Is the direction of (r), increasing or decreasing? ……………………………………
    i. What can you say about direction of straight lines with negative slopes? ……………
    ii. Deduce the role of the slope (a) in the equation of the straight line? ………………..
b. Compare slopes of group-*A*: $a_{(r)} < \cdots < \cdots$
c. From graphs of Group-A, which line is closest to $y - axis, (r), (s)\ or\ (k)$? ………..

Conclusions:	As the ***slant*** of a straight line ***increases***, then its graphical representation approaches $y - axis$ more.

Ex₃:Consider the straight lines $(\ell): y = 3x - \sqrt{2}\,x$ & $(\lambda): y = 2x - \sqrt{3}x$
1) Determine the slope (slant, director coefficient) of $(\ell)\,\&\,(\lambda)$.
    …………………………………………………………………………………………..
2) Which straight line is steeper? Justify. ……………………………………………